Amendment To The Claims

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claims 1-20 Cancelled

21. (Currently Amended) A heat integrated distillation column comprising:

an outer shell with an upper and a lower end;

a first inner volume within the outer shell;

a second inner volume within the outer shell, the first and the second inner volumes being separated by a dividing wall and being in heat exchanging contact with one another through the dividing wall;

a heat exchanger fluidly connected to one of either the first ~~and~~ or the second inner volumes to further exchange heat between the first and second inner volumes ~~without transferring mass between the first and second inner volumes, wherein the heat exchanger is fluidly connected with one of either the first or the second inner volume~~

a plurality of trays with downcomers positioned within either one of the first inner volume, the second inner volume, or both the first and second inner volume; and

wherein the heat exchanger is positioned at the downcomer of one of the plurality of trays.

22. (Currently Amended) The heat integrated distillation column of claim 21 ~~1~~ wherein the first inner volume is an enriching section and the second inner volume is a stripping section.

23. (Cancelled)

24. (Cancelled)

25. (Currently Amended) ~~The heat integrated distillation column of claim 3~~ A heat integrated distillation column comprising:

an outer shell with an upper and a lower end;

a first inner volume within the outer shell;

a second inner volume within the outer shell, the first and the second inner volumes being separated by a dividing wall and being in heat exchanging contact with one another through the dividing wall;

a heat exchanger fluidly connected to one of either the first or the second inner volumes to further exchange heat between the first and the second inner volumes;

a plurality of trays with downcomers positioned within either one of the first inner volume, the second inner volume, or both the first and second inner volume; and

wherein the heat exchanger is positioned between the plurality of trays.

26. (Currently Amended) The heat integrated distillation column of claim 22 ~~2~~ further comprising a plurality of packing within the first inner volume, the second inner volume, or both the first and second inner volume.

27. (Currently Amended) The heat integrated distillation column of claim 26 ~~6~~ wherein the packing comprises at least one of structured packing or random packing.

28. (Currently Amended) The heat integrated distillation column of claim 22 ~~2~~ wherein the enriching section is provided with a plurality of trays and downcomers and the stripping section is provided with at least one of structured packing or random packing.

29. (Currently Amended) The heat integrated distillation column of claim 22 ~~2~~ wherein the stripping section is provided with a plurality of trays and downcomers and the enriching section is provided with at least one of structured packing or random packing.

30. (Currently Amended) The heat integrated distillation column of claim 22 ~~2~~ wherein the dividing wall is a generally straight wall intersecting portions of the outer shell such that the outer shell is portioned into the first and second inner volumes.

31. (Currently Amended) The heat integrated distillation column of claim 22 ~~2~~ wherein the first and second inner volumes have cross-sectional areas that are inversely related such that as the cross-sectional area of the enriching section generally decreases from the lower end to the

upper end of the outer shell, the cross-sectional area of the stripping section generally increases from the lower end to the upper end of the outer shell.

32. (Currently Amended) The heat integrated distillation column of claim 21 ~~1~~ wherein ~~the~~ a outer shell is cylindrical and the heat integrated distillation column further comprises an inner tube positioned within and concentric with the outer shell, such that the dividing wall is created by the inner tube thereby defining one of the first and second inner volumes within the inner tube and the other of the first and second inner volumes in the annular space between the inner tube and outer shell.

33. (Currently Amended) The heat integrated distillation column of claim 21 ~~1~~ wherein the simultaneous general increase and general decrease of the cross-sectional areas occurs in a step-wise configuration.

34. (Currently Amended) The heat integrated distillation column of claim 21 ~~1~~ wherein the heat exchanger comprises a plurality of heat exchangers along the dividing wall between an upper and lower end of the distillation column.

35. (Currently Amended) The heat integrated distillation column of claim 21 ~~1~~ wherein the heat exchanger is fluidly connected to the volume configured to operate at a higher temperature.

36. (Currently Amended) The heat integrated distillation column of claim 21 ~~1~~ wherein the heat exchanger is fluidly connected to the volume configured to operate at a lower temperature.

37. (Currently Amended) The heat integrated distillation column of claim 21 ~~1~~ wherein the heat exchanger comprises at least one of a panel or tubular construction.

38. (Currently Amended) The heat integrated distillation column of claim 21 ~~1~~ wherein the heat exchanger is selected from a group consisting of one of the following ~~comprises at least one~~:

a smooth plate;

a textured plate;

a smooth tube;
a textured tube;
a coil;
a flat plate;
a dimple plate;
a dimpled tube;
a finned plate;
a finned tube;
a vertically oriented corrugated sheet; ~~and~~ or
a corrugated plate.

39. (Currently Amended) The heat integrated distillation column of claim 21 ~~1~~ further comprising vapor-liquid disengagement structure at the heat exchanger.

40. (Currently Amended) The heat integrated distillation column of claim 39 ~~19~~ wherein the vapor-liquid disengagement structure is selected from a group consisting of one of the following ~~comprises at least one of~~:
fins;
vanes;
corrugated structure packing sheet; ~~and~~ or
dumped packaging rings.

41. (Currently Amended) A method for distillation ~~use with a heat integrated distillation column having an outer shell, wherein an outer shell includes a first volume and a second volume in heat exchanging contact with one another through a dividing wall~~, the method comprising:
providing a heat integration distillation column having an outer shell with a first and a second volume in heat exchanging contact with one another through a dividing wall;
providing at least one ~~a~~ heat exchanger to further exchange heat between the first and second volumes wherein the heat exchanger is fluidly connected with one of the first or the second volumes;

providing a plurality of trays with downcomers positioned within the first inner volume, the second inner volume, or both the first inner and the second inner volume wherein the heat exchanger is positioned either at the downcomer of one of the plurality of trays or between the plurality of trays; and

moving contents through the heat exchanger to facilitate further heat transfer from the fluidly connected first or second volume to the other volume without transferring mass between the first volume and the second volume.

42. (Cancelled)

43. (Cancelled)